

We Claim:

1 1. A material comprising a proteinaceous prepolymer comprising first reactive
2 groups and a synthetic prepolymer comprising second reactive groups, at least a portion of said
3 first reactive groups being reacted with said second reactive groups.

1 2. The material of claim 1 selected from the group consisting of a compatibilized
2 copolymer and a compatibilized interpenetrating network.

1 3. The material of claim 2 wherein said portion is effective to provide said material
2 with durability and adhesion.

1 4. The material of claim 3 wherein said portion comprises first reactive groups
2 covalently bonded to said second reactive groups.

1 5. A material comprising keratin comprising first reactive groups and a synthetic
2 prepolymer comprising second reactive groups, at least a portion of said first reactive groups
3 being reacted with said second reactive groups.

1 6. The material of claim 2 wherein said proteinaceous prepolymer comprises keratin.

1 7. The material of claim 3 wherein said proteinaceous prepolymer comprises keratin.

1 8. The material of claim 4 wherein said proteinaceous prepolymer comprises keratin.

1 9. The material of claim 5 wherein said keratin is derived from hair.

1 10. The material of claim 6 wherein said keratin is derived from hair.

1 11. The material of claim 7 wherein said keratin is derived from hair.

1 12. The material of claim 8 wherein said keratin is derived from hair.

1 13. The material of claim 9 wherein said hair is human hair.

1 14. The material of claim 10 wherein said hair is human hair.

1 15. The material of claim 11 wherein said hair is human hair.

1 16. The material of claim 12, wherein said hair is human hair.

1 17. The material of claim 5 wherein said keratin is derived from a source selected
2 from the group consisting of skin, beaks, feet, horns, hooves or feathers.

1 18. A material comprising a proteinaceous prepolymer comprising first reactive
2 groups and at least one silicone comprising second reactive groups, at least a portion of said first
3 reactive groups being reacted with to said second reactive groups.

1 19. The material of claim 2 wherein said synthetic prepolymer is at least one silicone.

1 20. The material of claim 3 wherein said synthetic prepolymer is at least one silicone.

1 21. The material of claim 4 wherein said synthetic prepolymer is at least one silicone.

1 22. A material comprising keratin comprising first reactive groups and at least one
2 silicone comprising second reactive groups, at least a portion of said first reactive groups being
3 reacted with said second reactive groups.

1 23. The material of claim 6 wherein said synthetic prepolymer is at least one silicone.

1 24. The material of claim 7 wherein said synthetic prepolymer is a silicone.

- 1 25. The material of claim 8 wherein said synthetic prepolymer is at least one silicone.
- 1 26. The material of claim 9 wherein said synthetic prepolymer is at least one silicone.
- 1 27. The material of claim 10 wherein said synthetic prepolymer is at least one
2 silicone.
- 1 28. The material of claim 11 wherein said synthetic prepolymer is at least one
2 silicone.
- 1 29. The material of claim 12 wherein said synthetic prepolymer is at least one
2 silicone.
- 1 30. The material of claim 13 wherein said synthetic prepolymer is at least one
2 silicone.
- 1 31. The material of claim 14 wherein said synthetic prepolymer is at least one
2 silicone.
- 1 32. The material of claim 15 wherein said synthetic prepolymer is at least one
2 silicone.
- 1 33. The material of claim 16 wherein said synthetic prepolymer is at least one
2 silicone.
- 1 34. The material of claim 1 wherein said functionalized synthetic prepolymer is
2 selected from the group comprising thermoplastics and thermosets.

1 35. The material of claim 34 wherein said thermoplastics are selected from the group
2 consisting of polyesters, polycarbonates, polyolefins, polyethers, polysulfones, and urethanes.

1 36. The material of claim 2 wherein said functionalized synthetic prepolymer is
2 selected from the group comprising thermoplastics and thermosets.

1 37. The material of claim 36 wherein said thermoplastics are selected from the group
2 consisting of polyesters, polycarbonates, polyolefins, polyethers, polysulfones, and urethanes.

1 38. The material of claim 3 wherein said functionalized synthetic prepolymer is
2 selected from the group comprising thermoplastics and thermosets.

1 39. The material of claim 38 wherein said thermoplastics are selected from the group
2 consisting of polyesters, polycarbonates, polyolefins, polyethers, polysulfones, and urethanes.

1 40. The material of claim 5 wherein said functionalized synthetic prepolymer is
2 selected from the group comprising thermoplastics and thermosets.

1 41. The material of claim 40 wherein said thermoplastics are selected from the group
2 consisting of polyesters, polycarbonates, polyolefins, polyethers, polysulfones, and urethanes.

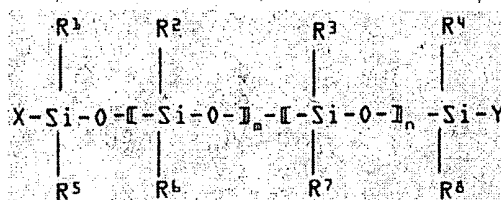
1 42. The material of claim 18 wherein said silicone is a mercapto-functional silicone.

1 43. The material of claim 22 wherein said silicone is a mercapto-functional silicone.

1 44. The material of claim 18 wherein said silicone is a vinyl-functional silicone.

1 45. The material of claim 22 wherein said silicone is a vinyl-functional silicone.

1 46. The material of claim 18 wherein said silicone has the following general structure:



2 wherein

3 m is from about 5 molar% to about 95 molar%;

4 n is from about 95 molar% to about 5 molar%; and,

5 X, Y, R¹, R², R³, R⁴, R⁵, R⁶, R⁷, and R⁸ independently are selected from the group consisting of

6 reactive groups, alkyl groups having from about 1 to about 3 carbon atoms, phenyl

7 groups, and perfluoro groups having from about 1 to about 3 carbon atoms;

8 provided that,

9 at least one of X, Y, R¹, R², R³, R⁴, R⁵, R⁶, R⁷, and R⁸ is a reactive group, most preferably

10 at least one of X, Y, R², R⁶, R³, and R⁷ are reactive groups;

11 no more than one of X, R¹, and R⁵ is a reactive group;

12 and, no more than one of Y, R⁴, and R⁸ is a reactive group.

1 47. The material of claim 46 wherein R¹, R⁴, R⁵, and R⁸ independently are selected

2 from the group consisting of methyl groups, ethyl groups, and phenyl groups.

1 48. The material of claim 46 wherein X and Y are selected from the group consisting

2 of methyl groups and vinyl groups.

1 49. The material of claim 47 wherein X and Y are selected from the group consisting

2 of methyl groups and vinyl groups.

1 50. The material of claim 46 wherein at least one of X, Y, R², R⁶, R³, and R⁷ is
2 selected from the group consisting of a reactive vinyl group and a reactive thiol group.

1 51. The material of claim 46 wherein R², R⁶, R³, and R⁷ comprise reactive groups
2 selected from the group consisting of reactive vinyl groups and reactive thiol groups.

1 52. The material of claim 46 wherein at least one of R², R⁶, R³, and R⁷ is selected
2 from the group consisting of a thiol terminated pendant group and a vinyl terminated pendant
3 group.

1 53. The material of claim 52 wherein at least one of R², R⁶, R³, and R⁷ is selected
2 from the group consisting of an *n*-alkylthiol pendant group comprising an alkyl group having
3 from about 1 to about 3 carbon atoms.

1 54. The material of claim 47 wherein at least one of R², R⁶, R³, and R⁷ is selected
2 from the group consisting of a thiol terminated pendant group and a vinyl terminated pendant
3 group.

1 55. The material of claim 54 wherein at least one of R², R⁶, R³, and R⁷ is selected
2 from the group consisting of an *n*-alkylthiol pendant group comprising an alkyl group having
3 from about 1 to about 3 carbon atoms.

1 56. The material of claim 48 wherein at least one of R², R⁶, R³, and R⁷ is selected
2 from the group consisting of a thiol terminated pendant group and a vinyl terminated pendant
3 group.

1 57. The material of claim 56 wherein at least one of R^2 , R^6 , R^3 , and R^7 is selected
2 from the group consisting of an *n*-alkylthiol pendant group comprising an alkyl group having
3 from about 1 to about 3 carbon atoms.

1 58. The material of claim 49 wherein at least one of R^2 , R^6 , R^3 , and R^7 is selected
2 from the group consisting of a thiol terminated pendant group and a vinyl terminated pendant
3 group.

1 59. The material of claim 58 wherein at least one of R^2 , R^6 , R^3 , and R^7 is selected
2 from the group consisting of an *n*-alkylthiol pendant group comprising an alkyl group having
3 from about 1 to about 3 carbon atoms.

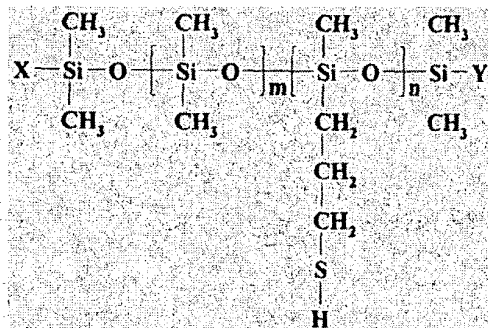
1 60. The material of claim 50 wherein at least one of R^2 , R^6 , R^3 , and R^7 is selected
2 from the group consisting of a thiol terminated pendant group and a vinyl terminated pendant
3 group.

1 61. The material of claim 60 wherein at least one of R^2 , R^6 , R^3 , and R^7 is selected
2 from the group consisting of an *n*-alkylthiol pendant group comprising an alkyl group having
3 from about 1 to about 3 carbon atoms.

1 62. The material of claim 51 wherein at least one of R^2 , R^6 , R^3 , and R^7 is selected
2 from the group consisting of a thiol terminated pendant group and a vinyl terminated pendant
3 group.

63. The material of claim 62 wherein at least one of R², R⁶, R³, and R⁷ is selected from the group consisting of an *n*-alkylthiol pendant group comprising an alkyl group having from about 1 to about 3 carbon atoms.

64. The material of claim 18 wherein said silicone has the following general structure:



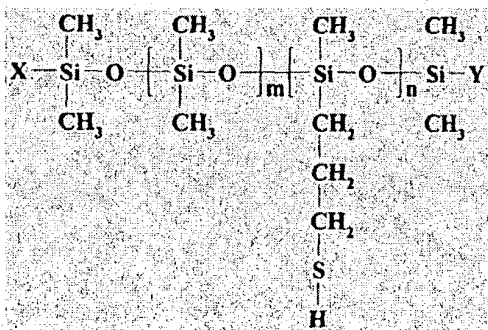
wherein

m is from about 5 molar% to about 95 molar%;

n is from about 95 molar% to about 5 molar%; and,

X and Y independently are selected from the group consisting of methyl groups, hydroxyl groups, and combinations thereof.

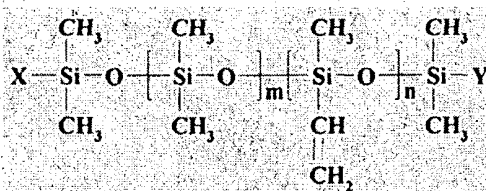
65. The material of claim 22 wherein said silicone has the following general structure:



wherein

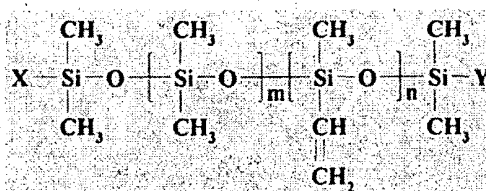
3 m is from about 5 molar% to about 95 molar%;
 4 n is from about 95 molar% to about 5 molar%;
 5 and, X and Y independently are selected from the group consisting of methyl groups, hydroxyl
 6 groups, and combinations thereof.

1 66. The material of claim 18 wherein said silicone has the following general structure:



2 wherein
 3 m is from about 5 molar% to about 95 molar%;
 4 n is from about 95 molar% to about 5 molar%; and,
 5 X and Y independently are selected from the group consisting of methyl groups, hydroxyl
 6 groups, and combinations thereof.

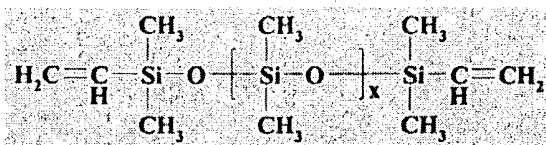
1 67. The material of claim 22 wherein said silicone has the following general structure:



2 wherein
 3 m is from about 5 molar% to about 95 molar%;
 4 n is from about 95 molar% to about 5 molar%; and,

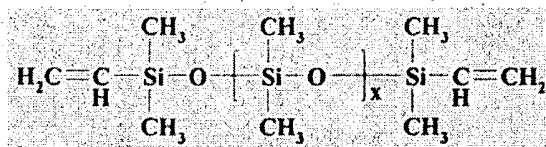
X and Y independent are selected from the group consisting of methyl groups, hydroxyl groups, and a combination thereof.

68. The material of claim 18 wherein said silicone has the following general structure:



wherein x is from about 1 to about 3000.

69. The material of claim 22 wherein said silicone has the following general structure:



wherein x is from about 1 to about 3000.

70. A medical implant comprising the material of claim 1.

71. A medical implant comprising the material of claim 5.

72. A medical implant comprising the material of claim 18.

73. A medical implant comprising the material of claim 22.

74. A medical implant comprising the material of claim 46.

75. A wound dressing comprising the material of claim 1.

76. A wound dressing comprising the material of claim 5.

77. A wound dressing comprising the material of claim 18.

1 78. A wound dressing comprising the material of claim 22.

1 79. A wound dressing comprising the material of claim 46.

1 80. The medical implant of claim 70 selected from the group consisting of orbital
2 floor implants; contact lenses; hydrocephalus shunts; chin implants; tracheostomy vents; tracheal
3 stems; breast prostheses; heart valves; finger joints; pacemaker leads; intra-aortic balloon pumps;
4 ureteral stems; oviductal plugs; testicular prostheses; penile prostheses; tibial cups; toe joints;
5 vaginal stems; urethral cuffs; hip implants; knee implants; gluteal pads; antireflux cuffs; artificial
6 skin; extracorporeal blood oxygenators; wrist joints; ear frames; eustachian tubes; maxillofacial
7 implants; and catheters.

1 81. The medical implant of claim 71 selected from the group consisting of orbital
2 floor implants; contact lenses; hydrocephalus shunts; chin implants; tracheostomy vents; tracheal
3 stems; breast prostheses; heart valves; finger joints; pacemaker leads; intra-aortic balloon pumps;
4 ureteral stems; oviductal plugs; testicular prostheses; penile prostheses; tibial cups; toe joints;
5 vaginal stems; urethral cuffs; hip implants; knee implants; gluteal pads; antireflux cuffs; artificial
6 skin; extracorporeal blood oxygenators; wrist joints; ear frames; eustachian tubes; maxillofacial
7 implants; and catheters.

1 82. The medical implant of claim 72 selected from the group consisting of orbital
2 floor implants; contact lenses; hydrocephalus shunts; chin implants; tracheostomy vents; tracheal
3 stems; breast prostheses; heart valves; finger joints; pacemaker leads; intra-aortic balloon pumps;
4 ureteral stems; oviductal plugs; testicular prostheses; penile prostheses; tibial cups; toe joints;
5 vaginal stems; urethral cuffs; hip implants; knee implants; gluteal pads; antireflux cuffs; artificial

6 skin; extracorporeal blood oxygenators; wrist joints; ear frames; eustachian tubes; maxillofacial
7 implants; and catheters.

1 83. The medical implant of claim 73 selected from the group consisting of orbital
2 floor implants; contact lenses; hydrocephalus shunts; chin implants; tracheostomy vents; tracheal
3 stems; breast prostheses; heart valves; finger joints; pacemaker leads; infra-aortic balloon pumps;
4 ureteral stems; oviductal plugs; testicular prostheses; penile prostheses; tibial cups; toe joints;
5 vaginal stems; urethral cuffs; hip implants; knee implants; gluteal pads; antireflux cuffs; artificial
6 skin; extracorporeal blood oxygenators; wrist joints; ear frames; eustachian tubes; maxillofacial
7 implants; and catheters.

1 84. The medical implant of claim 74 selected from the group consisting of orbital
2 floor implants; contact lenses; hydrocephalus shunts; chin implants; tracheostomy vents; tracheal
3 stems; breast prostheses; heart valves; finger joints; pacemaker leads; infra-aortic balloon pumps;
4 ureteral stems; oviductal plugs; testicular prostheses; penile prostheses; tibial cups; toe joints;
5 vaginal stems; urethral cuffs; hip implants; knee implants; gluteal pads; antireflux cuffs; artificial
6 skin; extracorporeal blood oxygenators; wrist joints; ear frames; eustachian tubes; maxillofacial
7 implants; and catheters.

1 85. The material of claim 1 wherein said proteinaceous prepolymer is selected from
2 the group consisting of collagen, fibrin, and a growth factor.

1 86. The material of claim 18 wherein said proteinaceous prepolymer is selected from
2 the group consisting of collagen, fibrin, and a growth factor.

1 87. The material of claim 22 wherein said proteinaceous prepolymer is selected from
2 the group consisting of collagen, fibrin, and a growth factor.

1 88. The material of claim 46 wherein said proteinaceous prepolymer is selected from
2 the group consisting of collagen, fibrin, and a growth factor.

1 89. A method comprising: providing proteinaceous prepolymers comprising at least
2 one first reactive group; providing synthetic prepolymers comprising at least one second reactive
3 group; and reacting said first and said second reactive groups.

1 90. The method of claim 89 wherein said proteinaceous prepolymer comprises
2 keratin.

1 91. The method of claim 89 wherein said synthetic prepolymer is at least one silicone.

1 92. The method of claim 90 wherein said synthetic prepolymer is at least one silicone.